STUDY OF THE EFFECTIVENESS OF MULTIMEDIA APPROACH IN LEARNING ACHIEVEMENT OF MATHEMATICS AND SCIENCE AT SECONDARY STAGE.

REVISED Ph.D SYNOPSIS

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INTRODUCTION

The ever increasing power of computers have virtually transformed all our spheres of life as it is widely used in areas of economy ,health, social life, agriculture, entertainment and so do education as well. Given the prevalence and importance of technology in daily life, it is valuable if teachers are able to utilize technology to improve students' learning effectiveness. Multimedia being the effective instructional and communication tool that fulfills the main aim of our educational system that is to develop knowledge and skills of students. Effective teaching requires flexibility creativity and responsibility in order to provide an instructional environment able to respond to the learners individual needs .One of the main ongoing challenge of today's time is mismatch between the teachers teaching style and students requirement which does not set for higher academic achievement. More over teachers often encounter difficulty or even inability to teach certain phenomenon especially related to certain topics that could not be demonstrated inside the classroom, some phenomenon are dynamic and requires repeated observation or microscopic observations .Thus multimedia combines, computer animations, graphics, text and sound to truly and graphically communicate certain abstract and personally unperceivable phenomenon that are difficult to be observed in real life. Multimedia can further develop interest and raise student's participation and motivation in the learning process. It is a professional responsibility to stimulate student interest in curricula and motivate students to learn through differentiated instruction. Lafrancois (2000) described teaching as an ongoing process of solving problems relating to communication, instruction, motivation classroom management, and evaluation Teaching must create artificial environments which creates mediation between the lived experiences of the world and the learning of the academic world (Lorillard 1993). Integration of instruction technology has shown successful results in creating such mediation (Hugo, 2003)

MULTIMEDIA

Definitions

Weidong Xhang (2003)-

"Multimedia can mean any kind of file or document, either a text or spreadsheet that have audio or video effects or "an interactive information cafe". Whatever it is not, it certainly is the most promising technology in education.

Tay Vaughan (2006)-

"Multimedia is any combination of text, graphic art, sound, animation and video delivered to you by computers or other electronic or digitally manipulated mean".

Meaning

Multimedia represents the latest effective instructional and communication tool that introduces into the classroom whole new ways of thinking about curriculum, interactions with students and even the nature of learning which fulfill the main aim of our educational system. The purpose of multimedia is to provide multiple communication channels to address the differences between learners and to present teaching content through optimum modalities, including text, narration, graphics, illustrations, photographs, charts, animations, videos, music, sound effects, virtual reality, and interactive programs. Each multimedia teaching material has its own purposes and timing. If multimedia is applied well, students' learning efficiency may be enhanced.

Packiam (1986), had referred to the use of appropriate and carefully selected varieties of learning experiences which when presented to the learner through selected teaching strategies will reinforce and strengthen one another in such a way that the learner will achieve predetermined objectives in an effective way.

Nature of Multimedia Approach

Multi - Many
Media - Techniques /methods.
Multimedia approach uses a number of media, devices, techniques, in the teaching learning process. Multimedia approach has come out of researches and

experiments in educational technology that have been undertaken in order to improve the process of teaching learning results and outcomes .
Multimedia approach aims at providing meaningful learning experiences via a mix of media in order to achieve predetermined objectives.
The choice of the media has to be done carefully so that one does not hamper or reduce the effect of the other i.e. each media must complement the after.
The media have to used sequentially and judiciously. Only necessary ones are to be used. Then it would be possible to make optimum use of them in a most economical manner.In multimedia approach, several media and techniques are used as powerful means of communication.

MEDIA CLASSIFICATION

S.No.	Media Type	Examples
1	Graphic	Books ,Pictures,Photographs,Maps,Charts ,Poster,Graphs Diagrams etc.
2	Display	Chalkboards ,Flannel Boards,Bulletin Boards ,Peg boards etc.
3	3 Dimensional	Models, Objects ,Specimen ,Puppets etc.
4	Projected	Slides,Film Strips,Transparencies,Video tapes,Films,Cassettes etc.
5	Audio	Radio,Gramophone,Records,Audiocassettes etc.
6	Video	Videocassettes ,CD, Computers etc.
7	Activity	Field Trips ,Dramitization,Demonstration,Role Playing etc.

Interactive multimedia is a tool which has had a great impact in the field of education.This tool uses five elements and combines them into a single powerful tools.
In this investigation under the study of research work being done the mode of multimedia is video and animations ,that will be shown to explain the topic to students while the teaching learning process continues.

Role of teacher in Multimedia approach

The teacher has to make a lot of modifications and adjustment if he has to adopt multimedia approach. His role would have a different annotation compared to the traditional role. He would have to make these changes.

i) The teacher has to adopt a number of methods and techniques, he cannot be satisfied with the lecture or the chalk talk method.

ii) The teacher has to be aware of the different available media and their availability the teacher should be physically competent to use and demonstrate the use of different media.

iii) The teacher should be skillful enough to make a judicious choice of media and be competent enough to mix them sequentially and in an orderly manner.

iv) The teacher's role is that of a facilitator or manager of activities. He has to lead his students for independent, individualized learning.

v) The teacher should provide experience such that the students can link practice and theory & integrate them.

Educational Implications of Multimedia

Multimedia enables students to represent information using several different media. Hypermedia links allow students to organize information in meaningful ways. Multimedia can take into account different learning styles. Some students learn by interpreting text, while others require more graphical or aural representations. Multimedia allows for self-pacing and discovery, students can take the time they need and choose the path of learning making learning meaningful and pleasurable. Multimedia helps in development of higher order thinking skills. Interactive multimedia encourages student. Multimedia provided the students the flexibility of anywhere, 'any time' learning.Multimedia helps in developing group and interpersonal skills. Better communication between students via e-mail, chat sessions etc., can encourage collaborative learning and enhance student-teacher interaction. Multimedia helps students to learn the content in a given discipline. It helps students to think effectively, practice problem solving and decision making.

MULTIMEDIA LEARNING

Multimedia means using more than one delivery device in delivering information. Using multimedia resources in education refers to conveying instructional message in to two main formats – words and pictures. Words include speech and printed text; pictures include static graphics (such as illustrations and photos) and dynamic graphics (such as animation and video). Different people learn differently.

Multimedia learning opens up space for people to learn in a way that suits them best and easily master the material. Furthermore, it enables learning at an individual's pace, due to its interactivity, which is a very important aspect of multimedia learning. The user interacts with the content since information is displayed as non-linear and it is activated on the basis of user input. In this ways, the user has complete control of information transfer.

The main goal of using multimedia in education is to put different types of media together in order to improve acquiring of knowledge then traditional media does.

According to Mayer there are seven **multimedia principles** designer must have in mind when designing multimedia instructional message. These are Multimedia Principle, Spatial Contiguity Principle, Temporal Contiguity Principle, Coherence Principle, Modality Principle, Redundancy Principle and Individual Differences Principle.

<u>According to Multimedia Principle, students learn better from words and pictures than from words alone</u>. Also, multimedia principle explains that students learn faster from animation and narration than from narration alone. It is because learners are able to build mental connections between corresponding words and pictures better when both exist (animation and narration) than when only one is presented (i.e. narration)

IMPORTANCE OF PROPOSED INVESTIGATION:

With the advancement in the level of using technology in all spheres of life, many researchers have been conducted in all parts of the world related to effects of using technology in all various fields including education. Technology is being used in improving educational standards of teaching learning process, evaluation and transmission of knowledge etc. Various different types of researches have been already done in different fields studying the role and effect of using multimedia of any sort in studying different parameters related to modified behavior of students. Being present in this technology world and being aware about the interest of today's generation of using technology in all spheres so this drives the interest of the research work as, with the utilization of technology in teaching learning process does the academic achievement is affected at any level and my research is specifically designed with the use of video and animation during the teaching as an aid to teach the topic interestingly.

STATEMENT OF THE PROBLEM

"STUDY THE EFFECTIVENESS OF MULTIMEDIA APPROACH IN LEARNING ACHIEVEMENT OF MATHEMATICS AND SCIENCE AT SECONDARY STAGE"

OBJECTIVES:

To compare effectiveness of teaching through the traditional and using video and animation under multimedia approach on the academic achievement of the secondary stage students -

a i) In context to subjects **–**Science and Maths
a i) In context to classes –Nine and Tenth.

REVIEW OF RESEARCH STUDIES RELATED TO :
EFFECTIVENESS OF MULTIMEDIA IN LEARNING

Edwards, et.al (1975) reviewed some researches on the effects of CAI on achievement, retention and learning rate and its effects on students of different ability levels and revolved that CAI as supplement to traditional teaching in terms of achievement and learning rate.

Hasselbring (1984) summarize results of research studies and meta analysis on the effects of computer based instruction on student achievement and attitudes and result favored the use of CAI over the traditional instruction

Bruder (1991) also suggests that an important benefit of multimedia is that it is fun to participate in as either a receiver or presenter of information.

Wenglinsky (1998) noted that for fourth- and eighth-graders technology has "positive benefits" on achievement as measured in NAEP's mathematics test. Interestingly, Wenglinsky found that using computers to teach low order thinking skills, such as drill and practice, had a negative impact on academic achievement, while using computers to solve simulations saw their students' math scores increase significantly

Lie (1998), Li (1994), Huang (2003) shyu (1996), Zhau (1986) all reported significant gain for CAI over traditional instruction

Das A. (1998), Exploring effectiveness of Computer Assisted Learning Materials on Rhymes in different Modes Found that Graphics text mode has been found comparatively weaker than the other modes in learning word meaning on rhymes in different modes.

Zyoud, M. (1999), Development of Computer Assisted English Language Teaching for VIII standard student show that by creating an interactive atmosphere ,The computerized exercise can help the student become familiar with significant amount of vocabulary, grammar and comprehension because it provides effective individualized instruction.

Schacter (1999) found that students with access to any of a number of technologies (such as computer assisted instruction, integrated learning systems, simulations and software that teaches higher order thinking, collaborative networked technologies, or design and programming technologies) show positive gains in achievement on researcher constructed tests, standardized tests, and national tests.

Roschelle, Pea, Hoadley, Gordin & Means, 2000; Means, et. al., 1993). Research indicates that computer technology can help support learning and is especially useful in developing the higher-order skills of critical thinking, analysis, and scientific inquiry "by engaging students in authentic, complex tasks within collaborative learning contexts" (The Results from other studies (Perez-Prado and Thirunarayanan 2002; Cooper 2001; Smith, Ferguson and Caris 2001) also suggest that students can benefit from technology-enhanced collaborative learning methods and the interactive learning process.

John(2000) found that audio visual aids in classroom enhances teaching methods and improve students comprehension.

Sivin-Kachala and Bialo (2000) -In a 2000 study commissioned by the Software and Information Industry Association, reviewed 311 research studies on the effectiveness of technology on student achievement. Their findings revealed positive and consistent patterns when students were engaged in technology-rich environments, including significant gains and achievement in all subject areas, increased achievement in preschool through high school for both regular and special needs students, and improved attitudes toward learning and increased self-esteem.

Murphy et al (2001) In their meta-analysis review of research conducted between 1993 and 2000 on the effectiveness of Discrete Educational Software(DES) , found evidence of a positive association between use of DES products and student achievement in reading and mathematics, an association consistent with earlier reviews of the research literature on the effectiveness of computer-based instruction (e.g., Kulik & Kulik, 1991; Kulik, 1994; Fletcher-Flinn & Gravatt, 1995; Ryan, 1991).

Cavanaugh's synthesis (2001) of 19 experimental and quasi-experimental studies of the effectiveness of interactive distance education using videoconferencing and telecommunications for K-12 academic achievement found a small positive effect in favor of distance education and more positive effect sizes for interactive distance education programs that combine an individualized approach with traditional classroom instruction.

Richard (2002)- found that multimedia technology can be catalyst for change, helping teachers modify their approach to teaching and learning.

Boster, Meyer, Roberto, & Inge (2002) examined the integration of standards-based video clips into lessons developed by classroom teachers and found increases student achievement. The study of more than 1,400 elementary and middle school students in three Virginia school districts showed an average increase in learning for students exposed to the video clip application compared to students who received traditional instruction alone.

Hsiao (2002), Hus (2000), Huang (2003), Lai (2002), Liu (2001) and Yu (2002) have found no significant difference between (CAI)Computer Assisted Instruction and traditional instruction**.**

Papanastasiou, Zemblyas, & Vrasidas (2003) In a study that examined relationship between computer use and students' science achievement based on data from a standardized assessment, found it is not the computer use itself that has a positive or negative effect on achievement of students.

Joy, B.H.H. and Shaiju, S.L. (2004), Development of Computer Assisted Teaching Material in History at Higher Secondary Level and its effectiveness concluded that while both the methods led effective learning, the CAT method was found superior to the lecture method,and that there is no gender difference in the scores obtained.

Suwana, R. (2004) Effectiveness of Computer Assisted Instruction for Primary School Students: An Experimental study has resulted in the development of Computer Assisted Instructional Program developed by the investigator was found significantly effective in learning.

Sheena (2004)- found that multimedia combines elements from a variety of audio visual aids, allowing a teacher to use his own material with computer based training course for efficient teaching .

O'Dwyer, Russell, Bebell, and Tucker-Seeley (2005) found that, while controlling for both prior achievement and socioeconomic status, fourth-grade students who reported greater frequency of technology use at school to edit papers were likely to have higher total English/language arts test scores and higher writing scores on fourth grade test scores on the Massachusetts Comprehensive Assessment System (MCAS) English/Language Arts test.

Murphy (2007) conducted randomized control trials to test for the effect of the use of instructional technology in foreign language comprehension and found significant, positive effects.

Singh, Y.P. (2007) conducted a comparative study of learning English spelling through computer and traditional method and revolved that CAI method was found superior than traditional method to teach English. Similar findings was reported by **Singh, Y.V. (2007)** when investigated the effectiveness of computer assisted instruction Vs traditional method in teaching science at upper primary level .

Rani (2007) investigated the effects of CAI on language achievement of children with learning disability and reported that CAI method was found highly superior than traditional method for disabled students and also reported that no gender difference was found

Yune-Kuang Cliff Liao (2007) investigated a meta analysis to synthesize research comparing the effects of CAI and traditional instruction on students' achievement in Taiwan and suggested that CAI is more effective then traditional instruction in Taiwan and had positive effects on achievements. Positive outcomes were found for students with CAI were reported by **Blok et. al.(2002), soe et. al.(2000). chiu (2002), and Ho (2000).**

Jagannath Mohanty (2008) on multimedia approach to learning- laid emphasis to ensure efficiency as well as effectiveness in teaching learning process teacher must intelligently select appropriate multimedia for teaching.

Ruffini,(2009). Stated that properly designed animations to illustrate concepts and procedures can generate interest, motivation, and engagement, which can promote deep learning.

Sethi(2010)- found that a benefit of visual aids in their function as educational tools for learning more effectively .Using audio visual aids helps students to use their visual capacity and increase students interest in subject.

Kumar and Tiwari (2011) has dome a study to the effectiveness of computer assisted instruction program and traditional method of teaching English in standard –9th. In the study effect of gender, and methods on teaching English in class 9th evaluated. Investigator perform this study on 90 students on the basis of the results investigator not found any significant difference between gender and methods.

Mehar,Ram and Kumar,Vipin(2013) reported audio visual aids were found to attain significantly higher achievement scores as compared to conventional group.

Gupta,Rainu and Tyagi ,Sushma(2014) revealed result that computer assisted instruction was effective in enhancing the achievement of students over to the conventional group.

Watker Ganesh Archana(2014) revealed that the use of ICT is more effective for the theoretical part in educational statistics than the conventional method of teaching.

Kaur,Navdeep(2014) stated that multimedia approach play an important role in improving achievement of students and suggests the use of multimedia approach in teaching in classroom.

Lata,Hemant . and Sharma,Sunita (2014)-concluded that multimedia method of instruction proves useful in increasing the achievement level of students.

REVIEW OF RESEARCH STUDIES RELATED TO :
EFFECTIVENESS OF MULTIMEDIA IN SCIENCE LEARNING

Joshi C.L. (1992),on **The construction and try out of networks diagrams for some topics of physics for standard XII Science stream**, concluded that results obtained there is a significant difference on mean achievement post test scores of pupils belonging to group A(high achievers) and group B(low achievers)..

Sindhi, N.O. (1996), The construction and try out of multimedia package for the teaching of physics in standard XI shows the effectiveness of multimedia packageThis proves that the teaching through multimedia package is more effective in comparison to conventional method of instruction. This shows that if the teaching is done through multimedia package than student can remember it for a longer time.

Phoolwala R.N. (1997), An inquiry into the utility and effectiveness of microcomputers in teaching science for standard X, concluded that
The students can learn effectively through microcomputers than trough traditional method., revealed highly favorable opinion towards science teaching through microcomputers.

Khirwadker, A. (1998), Development of Computer Software for learning chemistry of standard XI found that the software package was effective in terms of students'
achievement. Also CAI was found to be time effective, the academic achievement of student of experimental group was found to be affected by variables like IQ, academic motivation and attitudes and lastly, majority of experimental group students had positive attitude about various aspects of software package

Meera, S. (2000).Relative Effectiveness among Different Modes of Computer-based Instruction in Relation to Students' Personality Traits concluded that
Different modes of Computer based Instruction, viz. Drill, Practice and Simulation were more effective than conventional lecture method in realizing the instructional objectives in Biology at Class XI. Effectiveness of the conventional lecture method and the different modes of the Computer-based Instruction, viz. Tutorial, Drill and Practice and Simulation were not influenced by the learner's personality.

Dalwadi, N. (2001), Development of Computer Assisted Instruction in Science for the student of standard IX concluded that CAI was found to be effective individualized instructional technique for teaching science .Students had positive opinion towards the developed CAI.

Patel, R. (2001), A study of learning through Computer Assisted Learning Material in relation to selected production variables and contiguity
found significant gain through interaction with the Computer Assisted Learning and achievement has been found quite higher.

Bhatt (2002) investigated the **effectiveness of multimedia package on atomic structure and chemical bonding** and reported that both method CAI and traditional teaching was equally effective**.**

Vasanthi, A. and Hema, S. (2003), Effectiveness of teaching Chemistry for 1 year B.E. students through Computer Assisted Instruction Found significant difference between the mean gain score of the control group taught through traditional teaching method and the experimental group administrated by the Computer Assisted instruction

Bhutak H.R. (2004) ,Development and Effectiveness of Multimedia Package for Science. Multimedia package was more effective in terms of achievement and retention of science for both the groups of girls and the boys separately and jointly. (2) Self-study material was more effective than slide show for girls, while slide show proved more effective than self-study material for boys

Singh, B. (2005), Effectiveness of Computer Assisted Instruction for teaching Biology Both the methods were effective in enhancing the learning**.** While lecture method was more effective than CAI for the teaching cell,CAI was more effective then lecture method for teaching tissues.

Dange, J.K. and Wahb, S.A. (2006). Effectiveness of Computer Assisted Instruction on the Academic achievement of Class IX Student's Physical Science
Found t that no significant difference between mean gain scores of experimental(taught through CAI) and control group(taught through traditional teaching method) of pre post.

Van Lehn et al. (2006) showed positive effects of computer mediated tutoring on physics test scores when students who had not taken a physics course before were introduced to intermediate material, but not when they studied material designed for novices (demonstrating the value of using technology to encourage higher-order thinking skills). In a meta-analysis of the effects of different teaching strategies on science achievement.

Schroeder et al. (2007) showed that instructional technology had significant, positive effects on science test scores.

Dunleavy and Heinecke (2007) found that ubiquitous, or 1:1, computing has a positive effect on science achievement among at-risk middle school students.

Zigic et. al. (2007) developed an **interactive computer based learning strategy to assist in teaching water quality modeling to out Computer Based Instruction (CBI)** effects. In the study CBI aid comprised a hyper text markup language (HTML) module and concluded that all the students found CBI aid helpful and easy to follow also felt they were able to complete their project with minimum supervision.

Patel, Kinnary (2008). Computer Assisted Instruction in Physics for the students of standard XI: An Experimental study stated that the study has resulted in the development of a CAI program package was found significantly effective for the students .Comparative effectiveness of the CAI method was found to be more effective in terms of achievement scores. relative effectiveness of the package was equally effective in teaching boys and girls.

Nwaocha (2010) carried our a study in Nigeria to Enhance students interest in mathematics via multimedia presentation and reported multimedia presentations can improve students' understanding, enthusiasm, class attendance and satisfaction

Vivien et. al. (2011) invested a meta analysis on "**Are Multimedia resources effective in Life science Education?** "and concluded that multimedia learning was more effective then many traditional educational methods**.**

Nimawati,V.(2013) concluded that multimedia package for teaching science was found more effective for the scientific attitude of students

REVIEW OF RESEARCH STUDIES RELATED TO :
EFFECTIVENESS OF MULTIMEDIA IN MATHEMATICS LEARNING

Singh, R.D.; Ahluwalia, S.P.; and Verma, S.K. (1991), Teaching of Mathematics: Effectiveness of Computer Assisted Instruction (CAI) and Conventional method of instruction concluded that the students who used the computer scored significantly higher than those taught mathematics through the conventional method. & had highly favorable attitude towards mathematics than those who did not use the computer. Achievement ,and attitude towards mathematics were found to be independent of the sex factor.

Singh R.D. (1992), Effectiveness of teaching Mathematics through Computer Assisted Instruction and conventional method of instruction on cognitive and non cognitive variables Computer Assisted Instruction was always found superior, but the gains were more in the case of good and there was a definite positive change of attitude towards learning Mathematics on the part of both boys and girls due to the use of computers.

Rose, A.V. (1992), Effectiveness of the Computer Assisted Instruction with special reference to underachievers The study throws light on the application of Computer Assisted Instruction (CAI) and the Teacher Support System (TSS) for the optimum development of underachievers (UA).Both the CAI strategies were superior to the traditional method of instruction. And there was no relationship between the post treatment scores and the variable 'sex', 'locale' and 'achievement level' of the experimental group. In the case of the variablesIQ, study habits and Maths study attitude, the positive relationship between those variable and achievement at the pre treatment level was found to be cancelled at the post test.

Jothikani, N and Thiagarajan, A.P.(2004), Effectiveness of Computer Assisted Instruction in Mathematics among B.Sc., Degree students stated there is no significant difference between the mean scores of pre test for the control and experimental group in all six units with reference to the objectives such as knowledge, Comprehension and application and their level of achievement such as Low, Average and High achievers.The mean gain scores of the control group are significantly greater

than that of experimental group in all six units with reference to the objective and their level of achievement .Hence, it is concluded that the conventional method is more effective and efficient than CAI method.

Vansia, Falguni S. (2011) conducted a study **Development and Effectiveness ofComputer Based Learning Programme in Teaching Mathematics.** In this studyComputer Based Learning (CBL) Programme develop in Mathematics. Implementthis Programme in Urban and Rural area Students for Study the effectiveness.CBL method effectiveness was found comparatively better in terms of achievement scores of students.

RESEARCH GAPS :

Much of the research that have been conducted have been done majority in languages, science, physics or say specifically in single subjects. Not much research work is done in the field of secondary stage students taking two different subjects by taking experimental pre test post test two parallel group design for study. So seeking this as an opportunity this view point was taken as to further do research work related to the use of video and animation under multimedia approach in comparison to traditional method of teaching and then comparing the results of using these two methods.

HYPOTHESIS OF THE STUDY:

There will be no significant difference in the academic achievement scores of the secondary stage students taught through the traditional and using video and animation in multimedia approach.

a i) In context to subjects **–**Science and Maths
a i) In context to classes –Nine and Tenth.

DELIMITATIONS

1. The study will be conducted in CBSE Schools of Sri Ganganagar District .
2. The study will be conducted on secondary students(ninth and tenth class)teaching them using video and animation for explanation of certain topics under multimedia approach and traditional method in science and mathematics.
3. Ten topics of Science and mathematics will be selected from the syllabus prescribed by CBSE.

METHOD OF THE STUDY

This study adopted experimental pre test post test two parallel group design. The experimental group (X) was exposed to multimedia method of teaching while the conventional group (Y) represent the control group was exposed to usual conventional approach. The design of the study was as follows;

- Experimental group X; O1 X O2
- Conventional group, Y; O3 Y O4

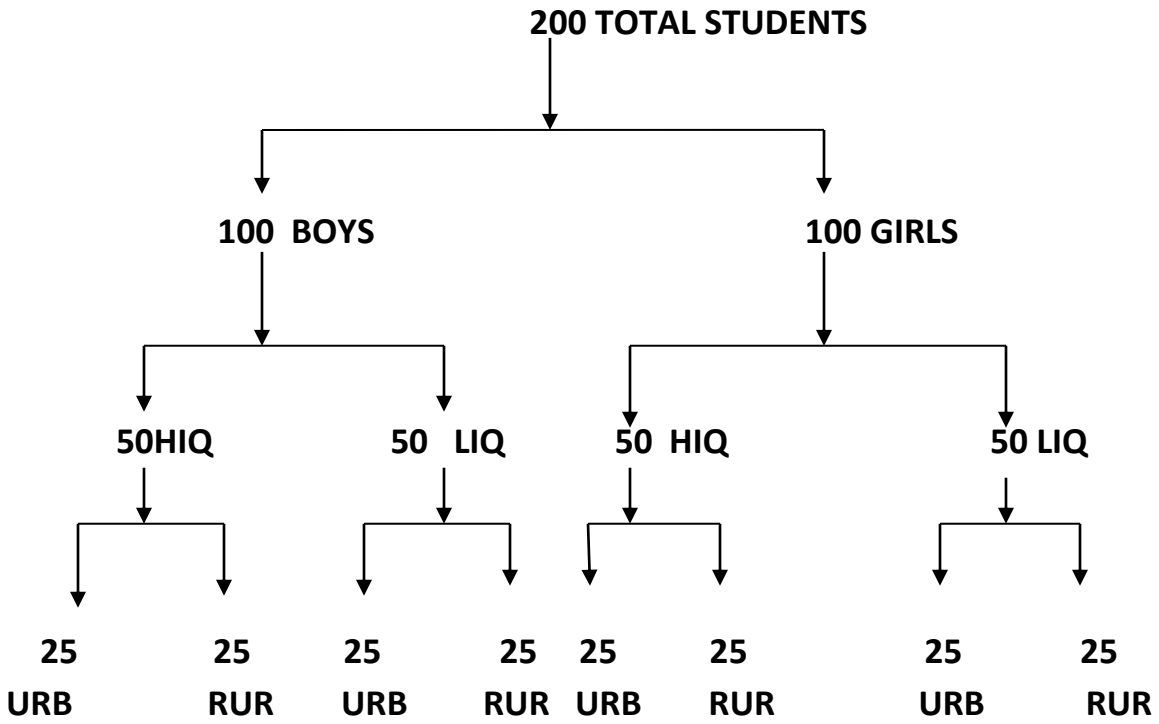
Where
O1**,** O3**;** pre test (performance to the two groups)
O2, O4 post test (performance to the two groups)
X treatment is given through multimedia approach.
Y conventional method of teaching

The experimental and control group will be administered a pre test of intelligence, before instructional session.

In this study, achievement is the dependent variable whereas different learning environments independent variables.

SAMPLE

The sample will be consisting of 200 secondary students of CBSE of Sri Ganganagar. Two groups of students are nearly equivalent as possible, and are employed at same time. Two groups are equated by employing randomized group technique. Technique of sampling was random and representative. Two group of students in all the schools will be randomly assigned to experimental and control group respectively.



TOOLS

- Intelligence test (Advanced Test Progressive Matrices –set B by J.C.Raven)
- Achievement test (to be developed by the investigator)

DESIGN OF THE STUDY

The research design may be defined as the sequence of steps taken ahead of time to ensure that the relevant data would be collected in a way that permits objective analysis of the different hypotheses formulated with respect to the research problem.

The investigation will be conducted through Experimental Design(equivalent control group design) for research. The experimental and control group will be administered pre test of learning style before instructional session.

After completion of instructional session, post test will be again administered to the experimental and control group.

INDEPENDENT VARIABLE: Multimedia modes of teaching and
Conventional teaching

DEPENDENT VARIABLE: Student achievement

CONTROL VARIABLE: Class, Age, and Language of instruction

PROCEDURE

Two different learning environments are designed within the scope of this study.

Process of experiment		
Prior to experiment	1	Expression of interest to students
	2	Conduction of intelligence test
	3	Selection of participants
	4	Allocation of experimental group and control group
During experiment	5	Pre test of concept and skills
	6	Completion of learning scenario
	7	Completion of post test
	8	Conclusion of experiment

STATISTICAL TECHNIQUES

The following statistical techniques will be employed to analyse the data obtained from the experiment to test the hypotheses.

- Graphical representations.
- Descriptive Statistical techniques like Means, Standard Deviation, achievement gain score ,Skills score

- Factorial design 2x2 ANOVA with repeated measures on gain on achievement score
- Factorial design2x2 ,analysis of variance
- For further investigation ,t –test will be employed wherever F-ratios are significant.

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APPENDIX - IV-A

MAHARSHI DAYANAND SARASWATI UNIVERSITY, AJMER

Format for Outline (Synopsis) of Proposed Research work

1. Nameof Scholar (In English) : Shweta Warring
   (In Hindi) : श्वेता वारिंग
2. Title of the Research Work : (In English) : "Study of effectiveness of multimedia approach in learning achievement of mathematics and science at secondary stage."

   (In Hindi) : "माध्यमिक स्तर के विद्यार्थियों में अधिगम हेतु गणित एवं विज्ञान की उपलब्धि के अन्तर्गत मल्टीमिडिया उपागम की प्रभावशीलता का अध्ययन।"

3. Location
   a. Institution/Department where the work is to be done -**IASE AJMER**
   b. Geographical area of Investigation, if any. -**SRI GANGANAGAR**
4. Introduction Importance of Proposed Investigation, Objective.
5. Review (Work already done on the subject of proposed Research Study.)
6. Research Gaps identified in the proposed field of investigation. (Based on the review)
7. Major Hypothesis, if any
8. Research methodology.
9. List of References cited.

Shweta 8/6/15

Signature of the Candidate with date

Outline Approved

8/6/2015

Name and Signature of supervisor with date & seal.

APPENDIX - VI

MAHARSHI DAYANAND SARASWATI UNIVERSITY, AJMER

CERTIFICATE BY SUPERVISOR
CERTIFIED THAT:

1. I am willing to guide the research work of Smt. SHWETA WARRING on the above subject if he/she is registered for Ph.D.
2. To the best of knowledge, the subject selected has not been studied and is not being studied so far in any University.
3. The subject of sufficient scope to keep the candidate engaged for two years.
4. The subject will lead to a valuable contribution. I have seen and approved the outline of proposed research work submitted by the candidate.
5. I have ...Nil..... (give numbers) Research candidate registered under my supervision and the serial number of this candidate whose application in being forwarded for registration is ...02..... (given the serial number)
6. The candidate in not in a close relation (the term of close relation is defined in the examination ordinance of the University)

8/6/15

Signature of the supervisor
with date

Certified that the available facilities will be extended to **Smt. SHWETA WARRING** for research work if he/she in registered for **Ph.D.**

Signature of Principal
Director of the Institution with date

Signature of the Head
Department with date